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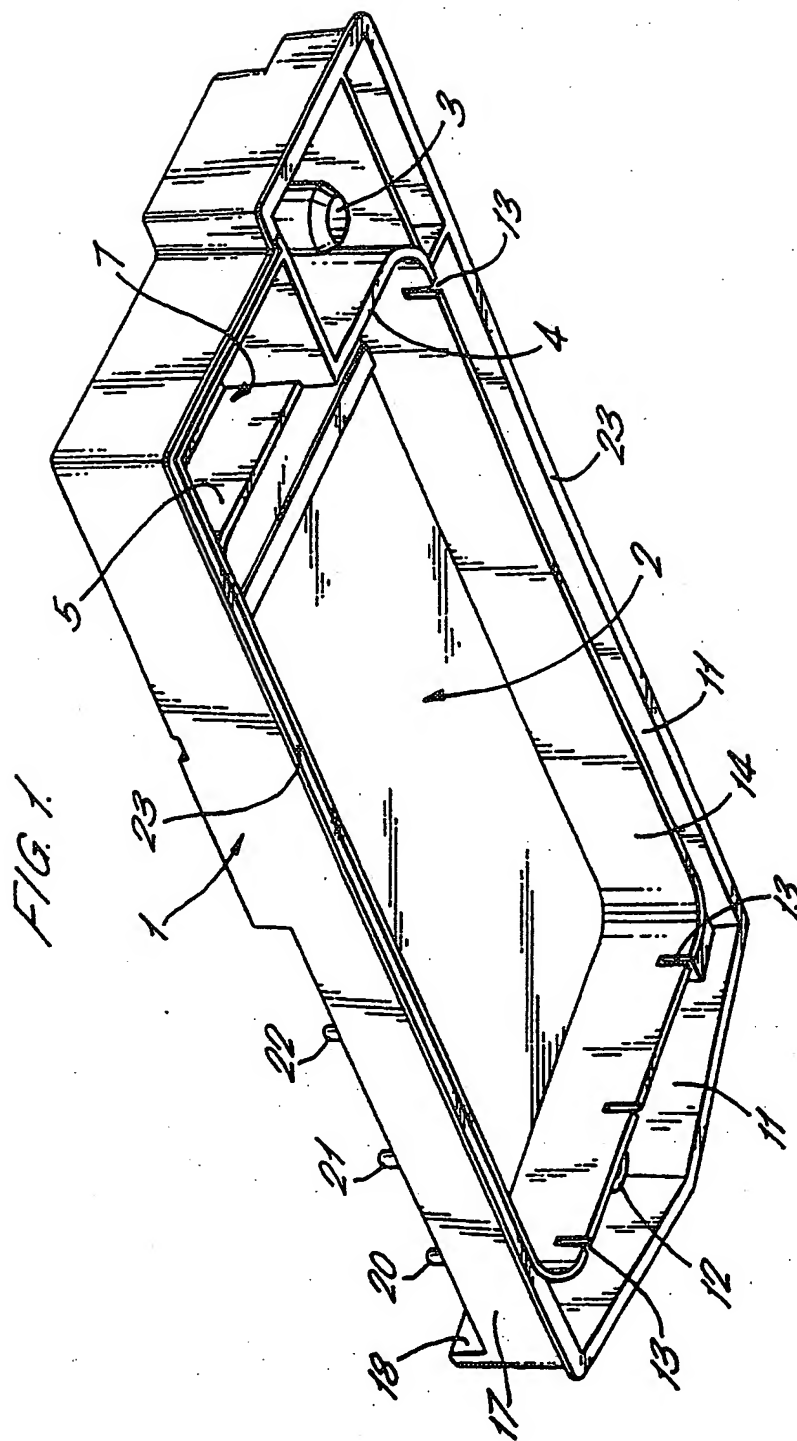
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⑤④ Comestible containing packages.

⑤⑦ A sealed package (1) containing one or more powder, paste or liquid comestible ingredients and being formed from substantially air- and water-impermeable materials, which package comprises an inlet (12) an outlet (3) a compartment (2) containing one or more powder, paste or liquid comestible ingredients, a channel (11) communicating with the inlet for the entry of a fluid medium into the package, which channel extends along at least a part of one side of the said compartment, the channel being separated from the compartment by a wall (14) which has at least one opening (13) formed therein for the entry of the fluid medium into the compartment containing the powder, paste or liquid comestible ingredients, the dimensions of the opening(s) being chosen so that, in use, jetting into the compartment and turbulent flow of the fluid medium in the compartment of the package is achieved.

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The present invention relates to packages containing comestibles and, in particular, to sealed packages which are formed from a substantially air- and water-impermeable material and which contain comestibles, preferably one or more ingredients for the preparation of beverages.

It has previously been proposed to seal beverage preparation ingredients in individual air-impermeable packages. For example, cartridges or capsules containing compacted ground coffee are known for use in certain coffee making machines which are generally termed "espresso" machines. In the production of coffee using these coffee machines the coffee cartridge is placed in a brewing chamber and hot water is generally caused to pass under pressure through the cartridge, thereby extracting the aromatic coffee constituents from the ground coffee and producing a coffee beverage.

Cartridges containing roast and ground coffee in which hot water flows under gravimetric force through the cartridge are also known. A cartridge of this general type is described in British Patent No. 1397116.

In our European Patent Application No. 87311325.2 there is described a package which contains at least one beverage preparation ingredient, e.g. roast and ground coffee. In a preferred embodiment the package is formed from a substantially air- and water-impermeable material and comprises a sealed body portion having a compartment containing the beverage ingredient and an outlet channel, the compartment and the outlet channel co-operating in such a manner that, in use, the beverage is filtered, thereby avoiding the necessity for an external filter.

There is also described in European Patent Application No. 87311325.2, a method for preparing a beverage which comprises positioning a beverage containing package at a brewing station, introducing water through water introduction means into the package, allowing the water to commingle with the beverage ingredient, and collecting the beverage so-formed through an outlet formed in the package.

The beverage packages as described in European Patent Application No. 87311325.2 are primarily intended to be used with a beverage preparation machine which handles the packages automatically or semi-automatically. A machine of this type is described in our European Patent Application No. 89302708.6. The packages may contain roast and ground coffee, leaf tea or one or more powder, paste or liquid beverage preparation ingredients such as powdered chocolate, powdered coffee or powdered soup. The powdered beverage preparation ingredients are thus usually soluble and dissolve in the water introduced into the package thereby to form the beverage. However, problems may be encountered when the packages contain one or more powdered beverage preparation ingredients because the powdered beverage preparation are often difficult to dissolve

rapidly in the course of preparation of the beverage.

Packages which contain comestibles other than beverage preparation ingredients, for example mustard powder or paste and powders or pastes for the preparation of sweet or savoury sauces are also known.

We have now developed a modified package containing one or more powder, paste or liquid comestibles which has an improved water entry system which facilitates the rapid dissolution and/or slurring of the comestibles.

Accordingly, the present invention provides a sealed package containing one or more powder, paste or liquid comestible ingredients and being formed from substantially air- and water-impermeable materials, which package comprises an inlet, an outlet, a compartment containing one or more powder, paste or liquid comestible ingredients, a channel communicating with the inlet for the entry of a fluid medium into the package, which channel extends along at least a part of one side of the said compartment, the channel being separated from the compartment by a wall which has at least one restricted opening formed therein for the entry of the fluid medium into the compartment containing the powder, paste or liquid comestible ingredients, the dimensions of the opening(s) being chosen so that, in use, jetting into the compartment and turbulent flow of the fluid medium in the compartment of the package is achieved.

The channel formed between the wall of the package and the compartment preferably extends along at least one side of the compartment containing the powdered comestible ingredients, more preferably along two sides of the compartment containing the powder, paste or liquid comestible ingredients.

Preferably the restricted openings comprise a plurality of elongate slots formed in the wall which separates the compartment containing the powder, paste or liquid comestible ingredients from the channel. The ratio of the length of the slot or slots to the width thereof is preferably in the range of from 5:1 to 10:1. A particular preferred slot for use with water under a pressure of about  $10^5$  Pa is a slot having a length of about 3.5 mm and a width of about 0.5 mm.

The fluid medium which is introduced into the packages of the present invention will generally be water for those packages containing powdered ingredients for the preparation of beverages. It will be appreciated, however, that for the preparation of salad cream and various sauces, such as tomato sauce, other liquid media may be used, for example an oil/water or vinegar/water mixture as appropriate. For the preparation of carbonated beverages the fluid medium will be carbonated water. The fluid medium is introduced into the package under pressure, for example a pressure of about  $10^5$  Pa.

The packages of the present invention are preferably packages which contain one or more powdered

beverage preparation ingredients and the invention will be more fully described hereinbelow with reference to such packages.

The beverage package of the present invention preferably has a body portion which may be formed, for example, from a moulded plastics material. The inlet and/or outlet of the package may be closed by a plug of a plastics material moulded into the inlet and/or outlet during the moulding of the body portion. Alternatively, the inlet and/or outlet may be covered by a substantially air- and water-impermeable material, for example aluminium foil or a laminated material, such as a laminate of plastic material/metal foil/plastic material prior to the opening of the inlet and/or outlet. Specific examples of materials which can be used are aluminium foil having a thickness in the range of from 30 to 60 micrometres coated with a layer of polypropylene or a laminate of polypropylene/aluminium foil/polyester.

The outlet in the package may be prepared during the beverage preparation cycle using a cutting and piercing tool for example of the type as described in our European Patent Application No. 89302708.6.

Alternatively, the inlet and/or outlet may be open and the beverage package provided with an outer wrapping or the like. For example, a plurality of packages may be provided with a shrink wrapped outer layer.

The present invention also includes within its scope a method for the preparation of a comestible from a sealed package containing one or more powder, paste or liquid comestible ingredients located in a compartment of the package, which method comprises introducing a fluid medium suitable for the preparation of the comestible under pressure into the package through an inlet formed therein, causing the fluid medium to enter the compartment containing the powder, paste or liquid comestible ingredients as one or more jets and/or as a turbulent flow, thereby effecting dissolution and/or slurring of the powder, liquid or paste comestible ingredients, and collecting the comestible from an outlet formed in the package.

The packages of the present invention are preferably provided with a recognition means whereby, in use, the package is identified by the machine into which it is placed for treatment and the identification of the package thereby causes it to be subjected to the correct treatment steps including the introduction of a fluid medium into the package. For the preparation of beverages from powdered beverage preparation ingredients the fluid medium introduced into the package will be water and/or air.

The recognition means may comprise one or more surface features formed in the body of the beverage package. For example, the package body may be provided with one or more indents, cut outs, protrusions or holes which can be identified by a mechanical sensor in the beverage preparation machine, the

mechanical sensor registering the presence or absence of the indents, cut outs, protrusions or holes.

The recognition means may, alternatively, comprise a system which can be sensed by a simple optical device, for example a bar code printed onto the body of the package, a pattern of through holes in the package, a pattern of contrasting tones or colours printed onto the package or packages containing different comestibles being of different colours.

The recognition means may also comprise one or more strips of a magnetic material applied to the body of the package which can be read by an appropriate magnetic sensor; one or more shaped or divided areas of metal foil applied to the package body which cause an inductive effect on movement of the package in the machine, which inductive effect can be sensed; or one or more electrically conductive areas formed on the body of the package which can be sensed electrically.

As mentioned above, the package of the present invention contains a powder, paste or liquid comestible, preferably one or more powdered beverage preparation ingredients, for example, powdered chocolate, powdered soup, powdered coffee, and sugar and/or creamer, as desired. One machine which can readily be adapted for the preparation of a beverage from the preferred beverage package of the invention which includes a recognition means is described in our European Patent Application No. 89302708.6. The only modification required to be made to such a beverage preparation machine is to incorporate an appropriate sensor or sensors into it, the sensor or sensors being designed to read the particular coding on the capsule and to send a signal to the controller, which then selects the appropriate beverage preparation cycle.

The recognition system used on the beverage packages of the present invention enables a single beverage preparation machine to prepare from different beverage packages a great number of different beverages which require different beverage preparation conditions.

The packages of the present invention may be treated by a machine which includes therein one or more sensors which are adapted to sense and identify a recognition means provided on a package inserted into the machine.

The sensor may be, for example, a mechanical sensor, an optical sensor, a magnetic sensor, an electrical sensor or an inductive sensor. The machine is preferably adapted so that the package is handled automatically following its insertion into the machine. For example, a machine of the type as described in our European Patent Application No. 89302708.6 can be fitted with an appropriate sensor to sense and identify a recognition means provided on beverage packages intended for use therewith.

The present invention will be further described

with reference to the accompanying drawings, in which:-

Figure 1 is a perspective view of part of a beverage package of the invention; and

Figure 2 is a top plan view of the beverage package of Figure 1.

Referring to Figures 1 and 2, a beverage package body is shown at 1. The body may be formed, for example, from a moulded plastics material. The body 1 has a compartment 2 in which the powdered beverage preparation ingredient or ingredients are contained. The package body has an outlet nozzle 3 formed therein. The compartment 2 is separated from the area of the body in which the nozzle 3 is formed by means of a wall 4. An extension 5 of wall 4 separates the compartment 2 from a chamber 7 which is positioned between the said compartment 2 and the outlet nozzle 3. As best shown in Figure 2, a flap 8 covers the chamber 7 and thereby prevents any powder which migrates from compartment 2 entering outlet nozzle 3. The flap 8 is joined along edge 9 thereof to a turned over portion of outside wall 10 of the container. The other three edges of the flap are in close proximity to the other walls of the chamber 7, but are not attached thereto. The flap 8 is constructed from a thin plastics material which is substantial enough to resist the weight of the powdered ingredient(s) before the capsule is used. The flap 8 is attached by flap edge 9 to the turned over portion of wall 10 and may be formed either by moulding a fine gap around the flap, or by shearing the flap on three sides as a post-moulding operation.

In use of the beverage package as shown in Figures 1 and 2 the bottom of the package is sealed by means of an aluminium foil or a laminated foil which is heat sealed to the lower edges of walls 4 and 10 and for the lower outer edge 23 of the package 1. Water enters the package at a pressure of about  $10^5$  Pa via inlet 12 which is opened by piercing or cutting the material covering the said opening. The water enters a channel 11 surrounding two sides of the compartment 2 containing the beverage ingredients. The water, which is under pressure, is forced through a plurality of elongate slots 13 formed in the wall 14 which separates channel 11 from compartment 2. The slots 13 as shown in Figure 1 are each approximately 0.5 mm wide and 3.5 mm long. The slots 13 act to restrict the flow of water under pressure through them and give rise to jetting into the compartment and turbulent flow of the water in the compartment 2. The jetting and turbulent flow effects a mixing and dissolution of the beverage preparation ingredients. In the arrangement as shown in Figure 1, three slots 13 are spaced at intervals along the short arm of wall 14 adjacent the inlet 12 and a single slot is positioned in the long arm of wall 14 at the end of channel 11 remote from the inlet 12. The water entering through the three slots 13 in the short arm of wall 14 penetrates the compart-

ment 2 containing the beverage preparation ingredients and preferably will enter this compartment as jets of water with an associated turbulence around the edges thereof. The jetting/turbulence acts to wash the powder away from the slots and avoids the powder merely wetting and forming agglomerates. The water entering through the single slot 13 in the long arm of wall 14 assists in washing away any powder near to the outlet area and in the general circulation of water in the package. The beverage so-formed, or the mixture of beverage ingredient(s) and water, then passes through a slit 15, formed between the bottom of wall 5 and the aluminium foil or laminated foil sealing the bottom of the package, into chamber 7. The pressure of the beverage, or the mixture of beverage ingredient(s) and water causes the flap 8 to be displaced by the flow thereof and the beverage then flows into outlet nozzle 3 which is opened by piercing or cutting the material which covers it. The beverage is then collected in a cup or other receptacle placed below the outlet nozzle 3. It will be understood that the velocity of the water entering the package will be chosen so that the desired jetting and turbulent flow of water into and in the package is achieved. Using the package as illustrated in Figures 1 and 2 it is possible to prepare 160 ml of chocolate from powdered chocolate in 20 seconds by passing water at a pressure of  $10^5$  Pa through the package.

The beverage package as illustrated in Figures 1 to 2 incorporates the recognition means which is a preferred feature of the invention. The package of the invention 1 containing one or more beverage preparation ingredients has a generally rectangular shape with flat top and bottom surfaces and is thereby suitable for insertion into a beverage preparation machine, for example of the type as described in our European Patent Application No. 89302708.6, longitudinally through a slot.

The package is also provided, as best shown in Figure 2, with teeth 15 moulded along one side wall of compartment 2. The teeth 15 have recesses 16 formed therebetween. These teeth 15 are intended to enable the beverage package to be driven through a beverage preparation machine by the engagement of the teeth 15 with the tooth of a cam (not shown). The side wall 17 of the beverage package has an elongate recess 18 formed therein near to the leading end 19 of the package.

As the package is driven into the beverage preparation machine the elongate recess 18 is sensed as the side edge of the package passes beneath a sensing arm (not shown). The elongate recess has a plurality of upstanding pegs 20, 21, 22 located therein and as the package is driven into the machine by the engagement of the teeth 15 with the tooth of a cam, the sensor senses the presence or absence of upstanding pegs 20, 21, 22.

If one or more of pegs 20, 21, 22 is not present the

sensing arm will thereby identify a different type of beverage package. The sensing arm operates a switch (not shown) which thereby transmits information concerning the presence or absence of the pegs on the package to the control mechanism for the beverage dispensing machine. The arrangement of pegs 20,21,22 on the package thus identifies the type of package to the controller which then selects the appropriate beverage preparation conditions.

The presence or absence of the pegs 20,21,22 provides scope for the sensing arm to sense up to 8 different types of beverage packages. Thus, if the presence of a peg at a particular location is coded as 1 and the absence of a peg coded as 0, the following code combinations can be achieved.

000  
001  
010  
100  
101  
110  
011  
111

It will be understood that the presence of one or more further pegs at the top of package wall 17 would provide an even larger number of code combinations.

When the beverage preparation machine has selected the appropriate beverage preparation conditions, the water inlet 12 of the package is pierced or cut, an outlet 3 formed in the package and water caused to flow under pressure through the compartment containing the beverage ingredient(s). The chosen beverage then being collected in a cup or receptacle placed below the outlet 3 of the package.

It will be appreciated that for different types of packages the beverage or other ingredient may require significantly different treatment. Thus, some beverages will be prepared with hot water and some with cold water, whilst others, such as espresso coffee, will require a smaller amount of water for their preparation. Preparation times may require to be varied. Similarly water and/or air may be required either for preparing/dispersing the beverage/ content of the package or for the purpose of pre-cleaning an inlet pipe or flushing out a used package. Furthermore, a user may require a particular beverage to be dispensed in combination with one or more ingredients from independent sources, e.g. powdered milk and/or sugar.

Although the present invention has been described with specific reference to the preparation of beverages from powdered beverage preparation ingredients, it is to be understood that the invention is not limited to packages containing only powdered beverage ingredients, but also includes within its scope packages containing other powder, paste or liquid comestibles.

## Claims

1. A sealed package containing one or more powder, paste or liquid comestible ingredients and being formed from substantially air- and water-impermeable materials, which package comprises an inlet, an outlet, a compartment containing one or more powder, paste or liquid comestible ingredients, a channel communicating with the inlet for the entry of a fluid medium into the package, which channel extends along at least a part of one side of the said compartment, the channel being separated from the compartment by a wall which has at least one opening formed therein for the entry of the fluid medium into the compartment containing the powder, paste or liquid comestible ingredients, the dimensions of the opening(s) being chosen so that, in use, jetting into the compartment and turbulent flow of the fluid medium in the compartment of the package is achieved.
2. A package as claimed in claim 1 wherein the inlet and/or the outlet is covered by a substantially air- and water-impermeable material prior to the formation, in use, of the inlet or outlet in the package.
3. A package as claimed in claim 1 wherein the inlet and/or the outlet is closed by a plug prior to the formation, in use, of the inlet or outlet in the package.
4. A package as claimed in any one of the preceding claims wherein the channel extends along at least one side of the compartment containing the comestible ingredients.
5. A package as claimed in claim 4 wherein the channel extends along two sides of the compartment containing the comestible ingredients.
6. A package as claimed in any one of the preceding claims wherein the restricted openings comprise a plurality of elongate slots formed in the wall which separates the compartment containing the comestible ingredients from the channel.
7. A package as claimed in claim 6 wherein the ratio of the length of the slot or slots to the width thereof is in the range of from 5:1 to 10:1.
8. A package as claimed in claim 7 wherein the length of the slot or slots is about 3.5 mm and the width of the slot or slots is 0.5 mm.
9. A package as claimed in any one of the preceding claims wherein the powder, paste or liquid ingredient or ingredients are beverage preparation

Ingredients.

10. A package as claimed in any one of the preceding claims which is provided with a recognition means whereby, in use, the package is identified by the machine into which it is placed for treatment therefrom and the identification of the package thereby causes it to be subjected to the correct treatment steps including the introduction of a liquid medium into the package.

11. A package as claimed in claim 10 wherein the recognition means comprises one or more surface features formed in the body of the package.

12. A package as claimed in claim 10 wherein the recognition means comprises a bar code.

13. A package as claimed in claim 10 wherein the recognition means comprises a pattern of holes formed in the body of the package.

14. A package as claimed in claim 10 wherein the recognition means comprises a pattern of contrasting tones or colours.

15. A package as claimed in claim 10 wherein the recognition means comprises one or more strips of a magnetic material.

16. A package as claimed in claim 10 wherein the recognition means comprises an inductive device.

17. A package as claimed in claim 10 wherein the recognition means comprises a plurality of electrically conductive means.

18. A method for the preparation of a comestible from a sealed package containing one or more powder, paste or liquid comestible ingredients located in a compartment of the package, which method comprises introducing a fluid medium suitable for the preparation of the comestible under pressure into the package through an inlet formed therein, causing the fluid medium to enter the compartment containing the powder, paste or liquid comestible ingredients as one or more jets and/or as a turbulent flow, thereby effecting dissolution and/or slurring of the comestible ingredients, and collecting the comestible from an outlet formed in the package.

19. A method as claimed in claim 18 wherein the inlet and/or outlet in the package is/are formed by means of a piercing and cutting tool.

20. A method as claimed in claim 18 or claim 19 wherein the fluid medium is water, a water/oil mixture,

a vinegar/oil mixture or carbonated water.

21. A method as claimed in any one of claims 18 to 20 wherein the fluid medium is introduced into the package at a pressure of at least  $10^5$  Pa.

22. A method as claimed in any one of claims 18 to 21 wherein the jetting and/or turbulent flow of the fluid medium into the compartment containing the powder, paste or liquid comestible ingredients is achieved by causing the fluid to flow through one or more openings into the said compartment.

23. A method as claimed in claim 22 wherein the openings are elongate slots.

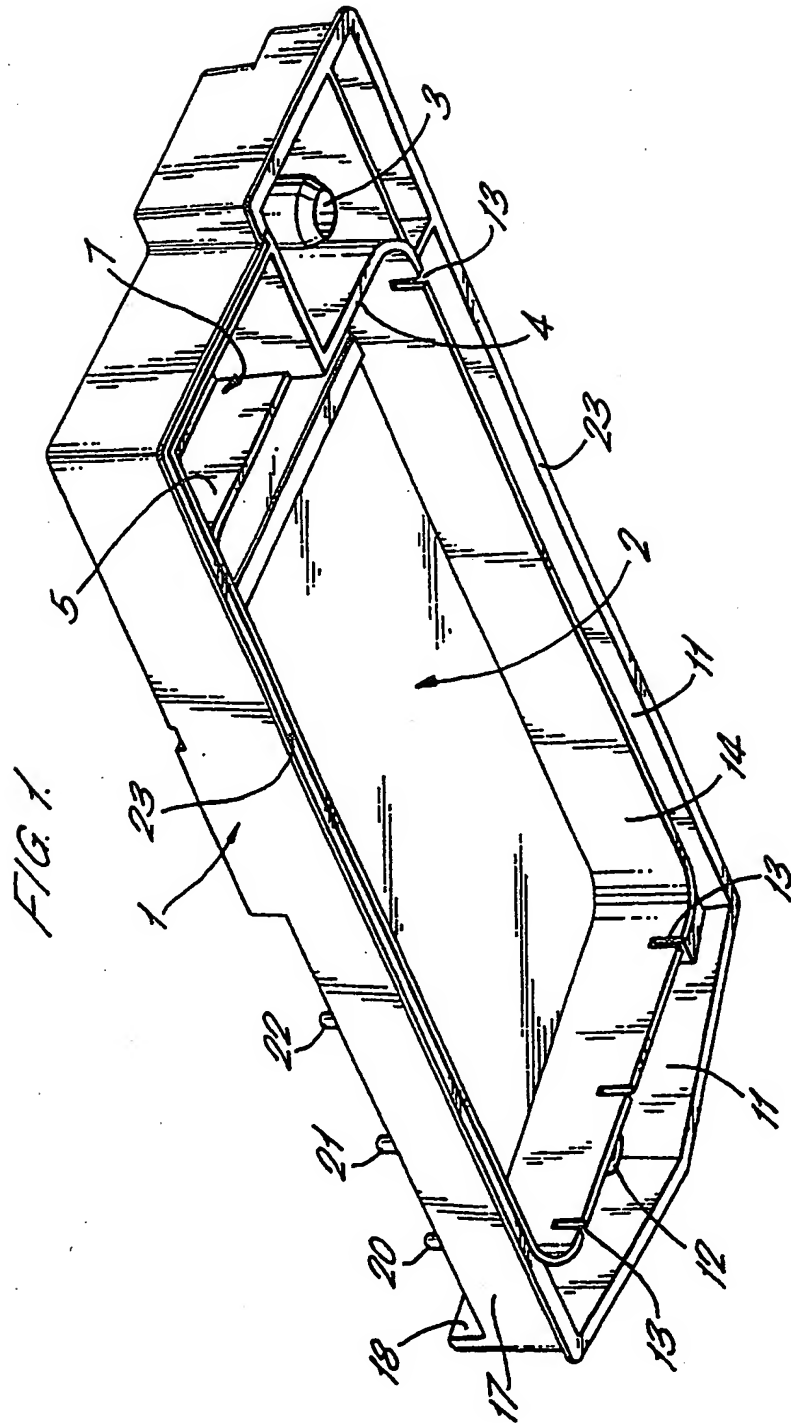
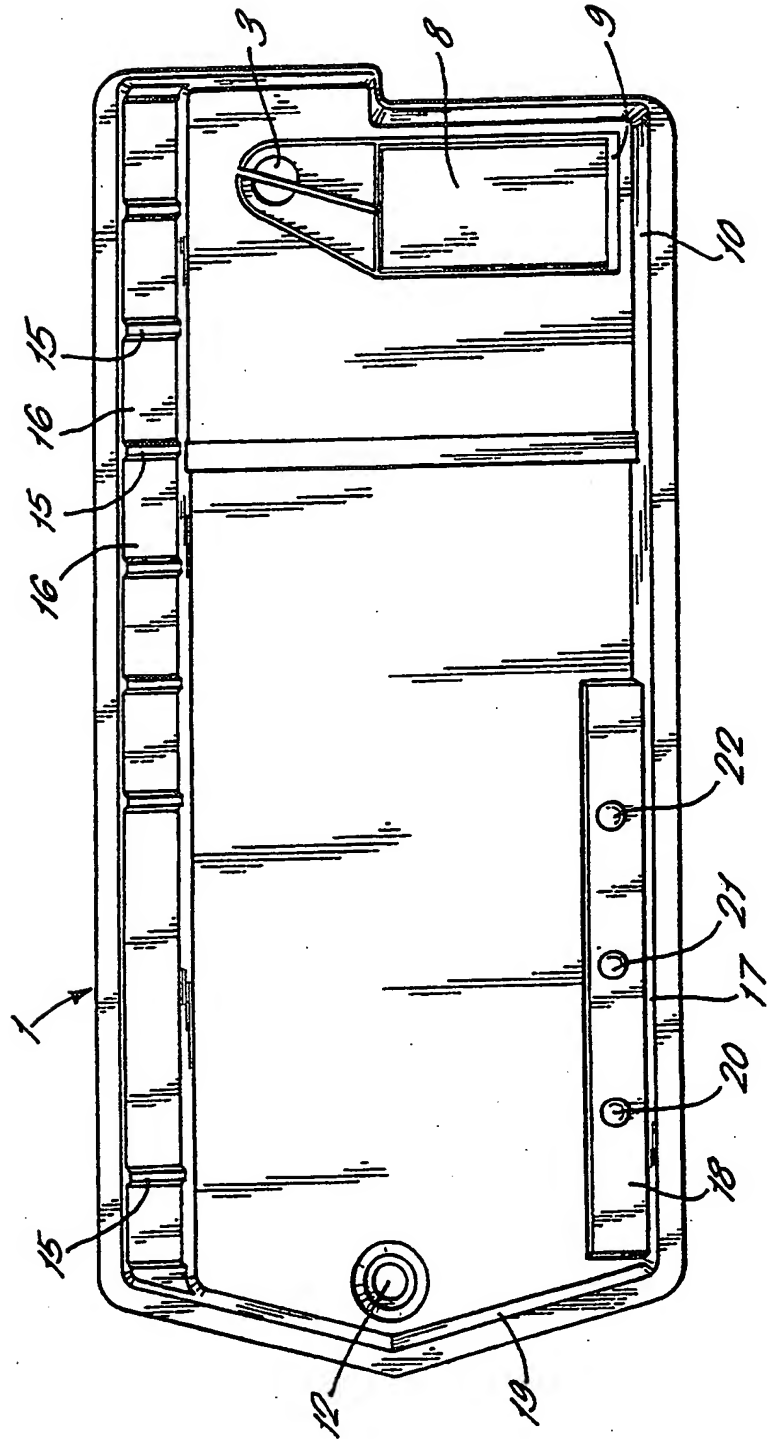




FIG. 2.



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## EUROPEAN SEARCH REPORT

Application Number

EP 91 30 2539

| DOCUMENTS CONSIDERED TO BE RELEVANT   |   |  |  |
|---|---|--|--|
| Category  | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim                                | CLASSIFICATION OF THE APPLICATION (Int. CLS) |
| D,X   | EP-A-0272922 (GENERAL FOODS LIMITED)<br>* the whole document *                | 1, 2, 4,<br>5, 9, 18<br>19-22                    | B65D81/00                                    |
| D,Y   | ---   |  |  |
| D,Y   | EP-A-0334572 (GENERAL FOODS LIMITED)<br>* the whole document *                | 19-22  |  |
|   |   |  | TECHNICAL FIELDS<br>SEARCHED (Int. CLS)      |
|   |   |  | B65D<br>A47J                                 |
| The present search report has been drawn up for all claims  |   |  |  |
| Place of search<br>BERLIN   |   | Date of completion of the search<br>02 JULY 1991 | Examiner<br>SMITH C.                         |
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